WILBUR-ELLIS®

From Mapping to VR Application and Beyond

Jason Ellsworth, Ph.D.

14 July 2010

Field Technology

Right Product • Right Place • Right Rate

Wilbur-Ellis Company

Knowledge Acquired • Intelligence Applied

Field Technology

Knowledge Acquired • Intelligence Applied

- Agronomy
  - Electronic RECs and label Checking
  - SS Fertilizer and Chemical Applications
- Records
  - Scouting
  - Fieldman to Corporate
- Asset Management/Tracking
- Work Orders
- Traceability

Field Technology

Knowledge Acquired • Intelligence Applied

- And . . .

. . . It all needs to be done on the Internet . . .

. . . using a Browser!

Components of Yield

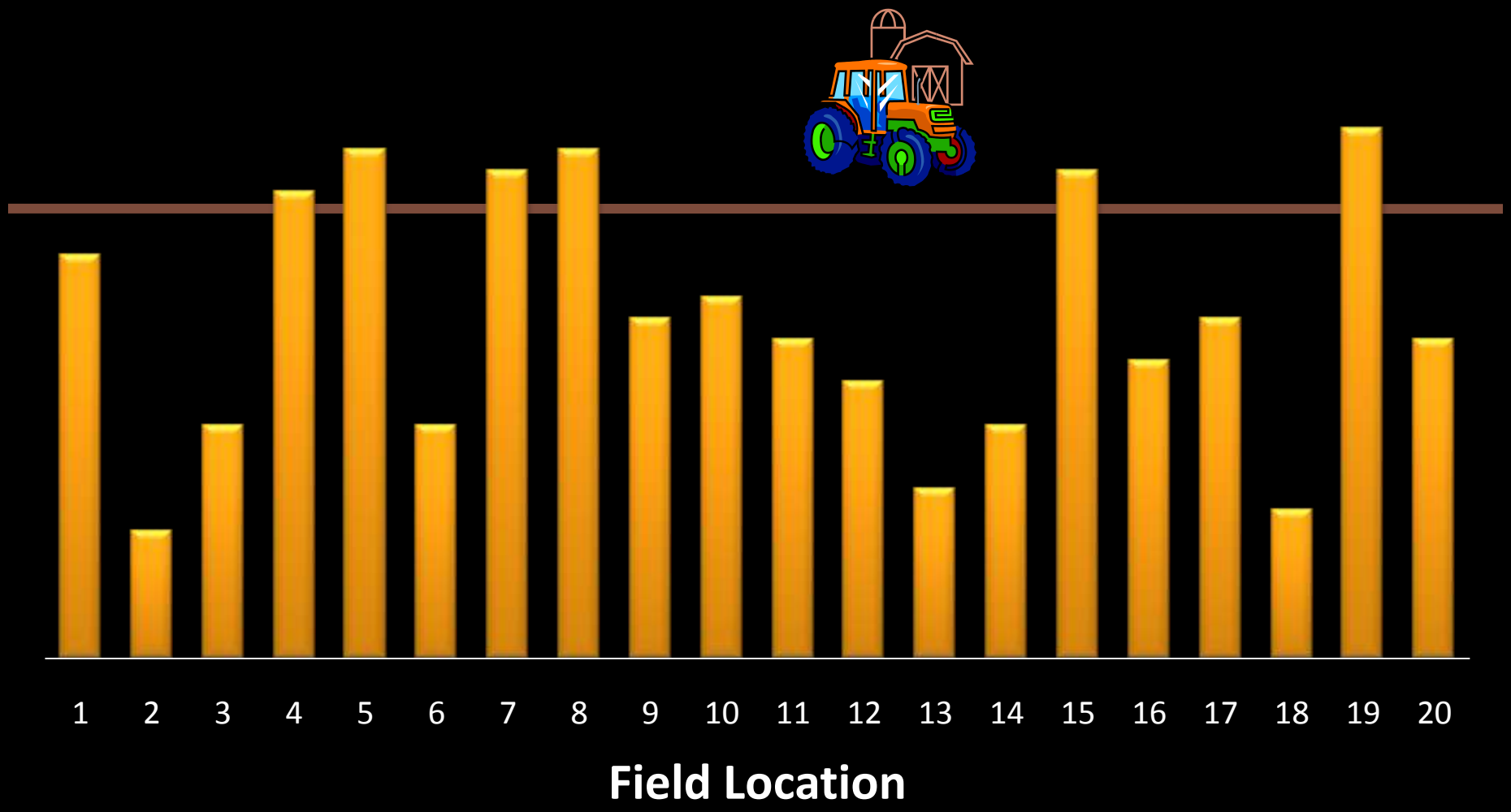
Knowledge Acquired • Intelligence Applied

$$y = f(x_1, x_2, x_3, x_4, \ldots x_{10})$$

- NPK, Macros
- Weather
- Moisture
- Genetics
- Light

- Zn B Fe, Micros
- Management
- CO_2
- Pests
- Other

Field Variability



Fertilizer Recommendation

Knowledge Acquired • Intelligence Applied

WILBUR-ELLIS®

Table 4. Phosphorus fertilizer rates[z] for total season application based on pre-plant soil test concentrations (0 to 12 inch depth) for Russet Burbank potato produced in the Columbia Basin.

Soil test P (sodium bicarbonate) (ppm)	Application Rate (lb/acre)[z] P_2O_5[y]
3	295
6	
9	
12	
12 to 20	
Above 20	

[z]Recommended a
conditions such
bonate irrigati
therefore, ap
needs.

[y]To conv

Table 5. Phosphorus application rates based on soil test P and free lime content

Soil test P[1] (0 to 12 inch)	Free lime content[2] (%) 0	5	10	15
(ppm P)	----------(lb/acre P_2O_5)----------			
0	240	280	320	360
5	160	200	240	280
10	80	120	160	200
15	0	40	80	120
20	0	0	0	40

[1]$NaHCO_3$ extraction

[2]Free lime is determined as calcium carbonate equivalent.

Table 5. Potassium application based on
tions (0 to 12 inch depth
produced in the Columb

Soil test K (sodium bicarbonate) (ppm)	A_1
60	400
120	300
180	200
240	100
>240	0

[z]To convert K_2O to K multiply by 0.83.

fertilizer rates[z] for total season
on residual soil concentrations
pth) and potential yield of Russet
ced in the Columbia Basin.

N ($NO^3 + NH^4$) (ppm)	Potential yield (tons/acre) 20	25	30	35
	N Application Rate (lb/acre)			
0	200	250	300	350
10	160	210	260	310
20	120	170	220	270
30	80	130	180	230

[z]Does not include N needed for microbial decomposition of previous crop residue or from mineralized soil organic matter. Assumes ppm x 4.0 = lbs/acre; may be adjusted for different bulk densities.

Table 4—Phosphorus fertilizer rates based on soil test P, lime concentration, and irrigation for onions grown in the Treasure Valley.

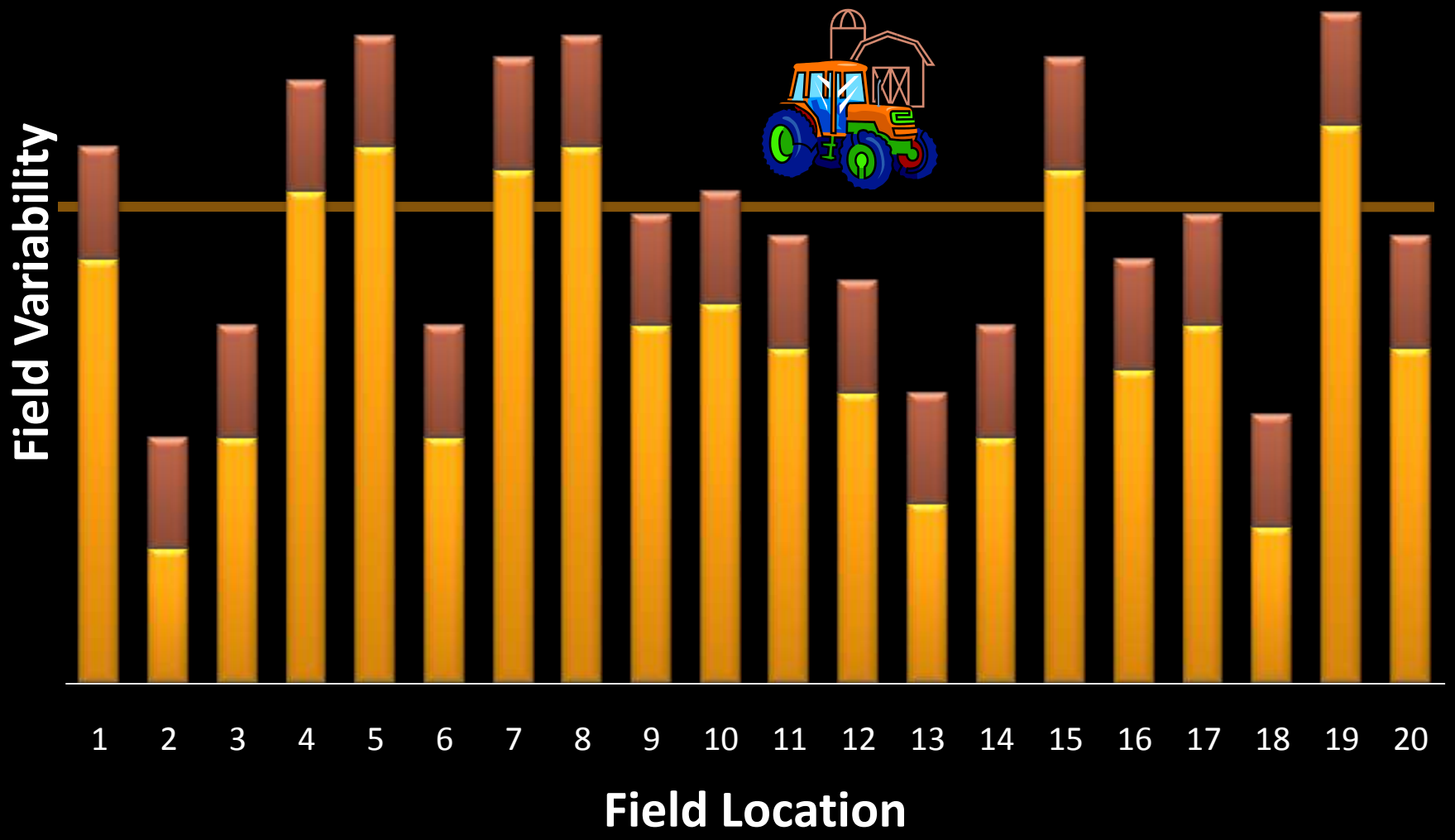
Bicarbonate (Olsen) soil test P @ to 12 inches (ppm)	Soil lime concentration (%)[a] 0	5	10	15
	P fertilizer application rate (lb P_2O_5 per acre)[b]			
	Not fumigated before planting			
0	200	240	280	320
5	140	180	220	260
10	80	120	160	200
15	20	60	100	140
20	0	0	40	80
25	0	0	0	20
above 30	0	0	0	0
	Fumigated before planting			
0	160	200	240	280
5	100	140	180	220
10	40	80	120	160
15	0	20	60	100
20	0	0	0	40
above 25	0	0	0	0

[a]Soil lime concentration as determined by calcium carbonate equivalent test.

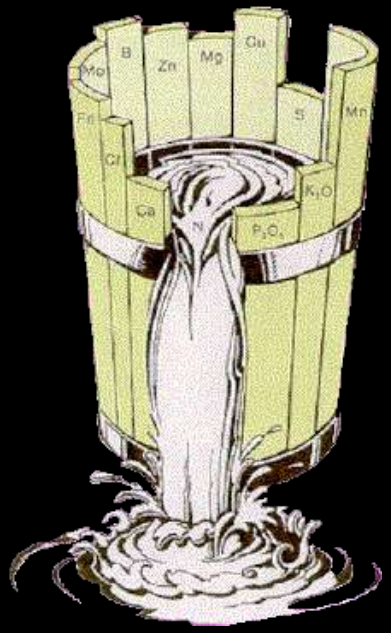
[b]To convert from the oxide (P_2O_5) to the elemental form (P) multiply by 0.43.

Source: Brown, B. 2000. Onions. Southern Idaho Fertilizer Guide. CIS 1081. University of Idaho, Moscow, ID.

P Fertilizer Application



Information on each point in the field



AgVERDICT™
KNOWLEDGE ACQUIRED, INTELLIGENCE APPLIED

Sample Summary

Location	Grower	Farm	Field	Area	Centroid
Pasco/Umatilla	BASIN FARMING LLC	Wallula	W-01	124.63 acres	46.094401,-118.883779

	Min	Max	Avg
P	8.0	41.0	19.8
K	71.0	234.0	125.2
Mg	72.6	229.9	143.4
Ca	740.0	2520.0	1376.7
WpH	4.9	8.3	6.7
B	0.4	1.2	0.7
Zn	0.8	3.6	2.1
Mn	6.0	32.0	15.1
Fe	6.0	64.0	27.5
Cu	0.4	1.4	0.8
Na	2.3	105.8	25.9
SS	0.0	0.2	0.1
OM	0.6	1.5	1.0

Sample Date: 12/2/2008 Soil Lab: Kuo Testing

SampleID	P	K	Mg	Ca	WpH	B	Zn	Mn	Fe	Cu	Na	SS	OM
10	22	157	133.10	1400.00	7.3	1.2	2	10.0	12	0.8	2	0.10	0.86
11	18	112	193.60	900.00	5.2	0.7	2	26.0	58	1.4	12	0.09	0.92
12	29	182	108.90	1700.00	7.4	0.6	3	16.0	18	1.0	32	0.07	1.42
13	28	98	145.20	740.00	5.2	0.5	2	22.0	60	1.0	21	0.04	0.97
14	22	112	181.50	940.00	5.5	0.5	2	20.0	56	1.2	2	0.04	0.92
15	25	121	181.50	920.00	5.4	0.9	2	24.0	54	1.2	2	0.06	1.45
16	13	129	96.80	2160.00	8.0	0.9	2	8.0	8	0.4	2	0.10	0.96
17	14	170	133.10	2520.00	8.0	1.0	2	10.0	12	0.8	28	0.10	1.14
18	24	165	169.40	1080.00	5.9	0.4	2	20.0	42	1.2	2	0.14	1.06
19	23	124	169.40	860.00	5.7	0.6	2	20.0	58	1.0	2	0.05	1.02
20	23	107	145.20	1060.00	6.0	0.4	2	14.0	40	1.0	7	0.04	1.07
21	11	118	96.80	1460.00	7.7	0.6	2	8.0	10	0.6	25	0.07	0.98
22	13	166	145.20	2440.00	8.1	1.0	2	10.0	14	0.8	48	0.10	1.45
23	34	177	157.30	900.00	5.8	0.6	4	28.0	62	1.2	58	0.09	1.06
24	23	106	169.40	1140.00	6.3	0.7	2	14.0	28	0.8	2	0.05	0.87
25	11	147	96.80	2000.00	8.0	0.5	3	8.0	14	0.6	23	0.09	1.26
26	25	129	169.40	900.00	5.8	0.6	2	28.0	48	1.0	7	0.06	1.09
27	17	100	145.20	1120.00	6.4	0.5	2	10.0	22	0.8	12	0.04	0.66
28	15	93	96.80	1620.00	7.9	0.7	1	6.0	8	0.4	18	0.05	0.77
29	22	101	169.40	900.00	5.7	0.6	2	20.0	36	1.0	62	0.05	0.86
30	21	124	157.30	1160.00	6.3	0.6	2	14.0	24	1.0	7	0.04	0.92

Site-Specific Nutrient Management

Knowledge Acquired • Intelligence Applied

WILBUR-ELLIS®

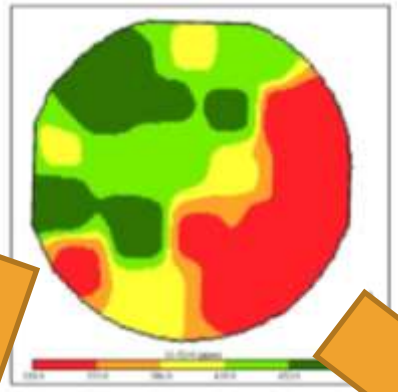
- Where to sample
  - Map the variability
  - Best way to map
- Sample
- Create a recommendation
  - Nutrient need
  - Yields
  - Size of area
  - Technology to Spread
- Monitor

AgRobotics™
FARMING INNOVATIONS

Soil Mapping

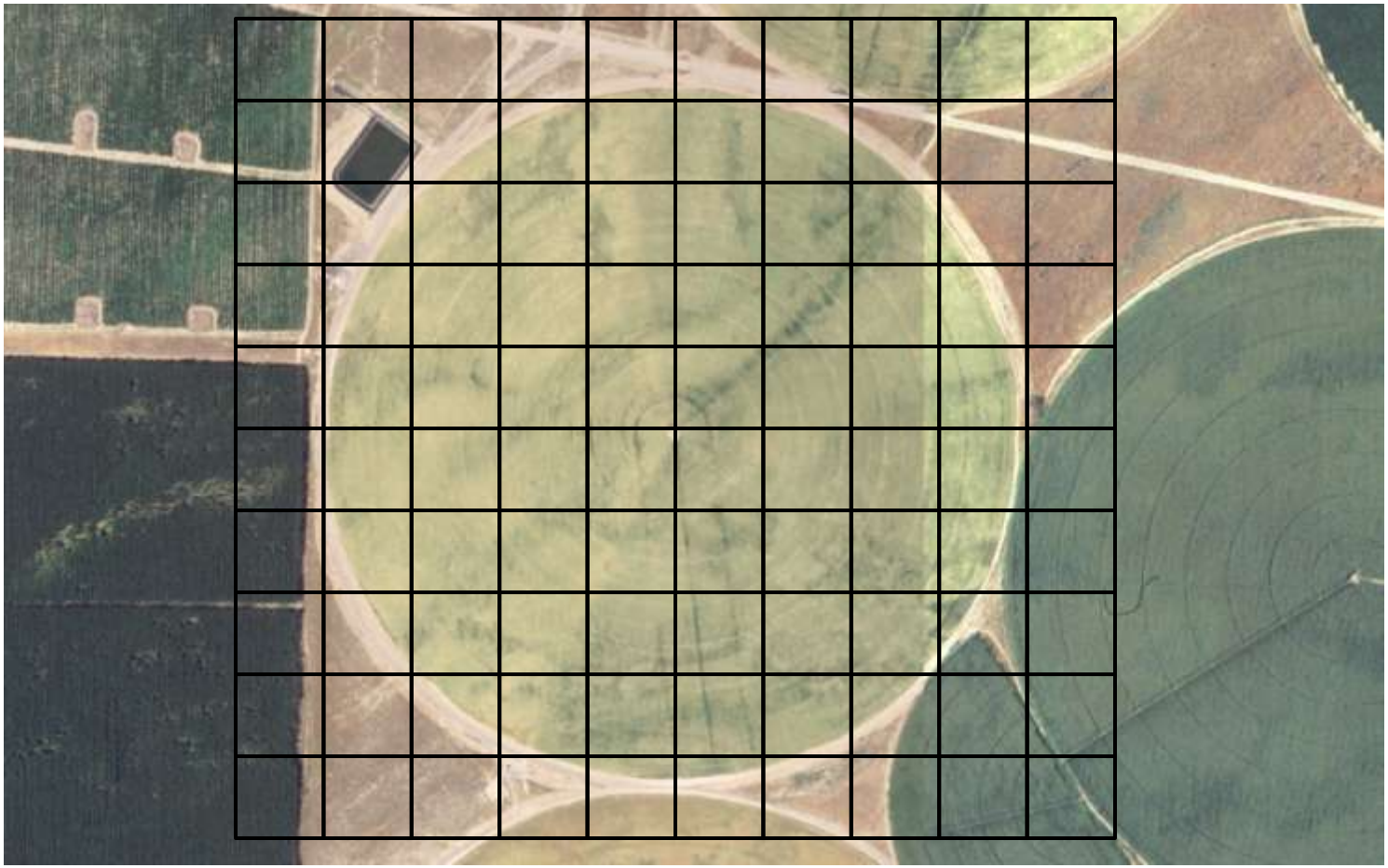
Knowledge Acquired • Intelligence Applied

- Where can we take a **soil sample** that gives us the most information to develop a sound **site-specific fertilizer recommendation**.



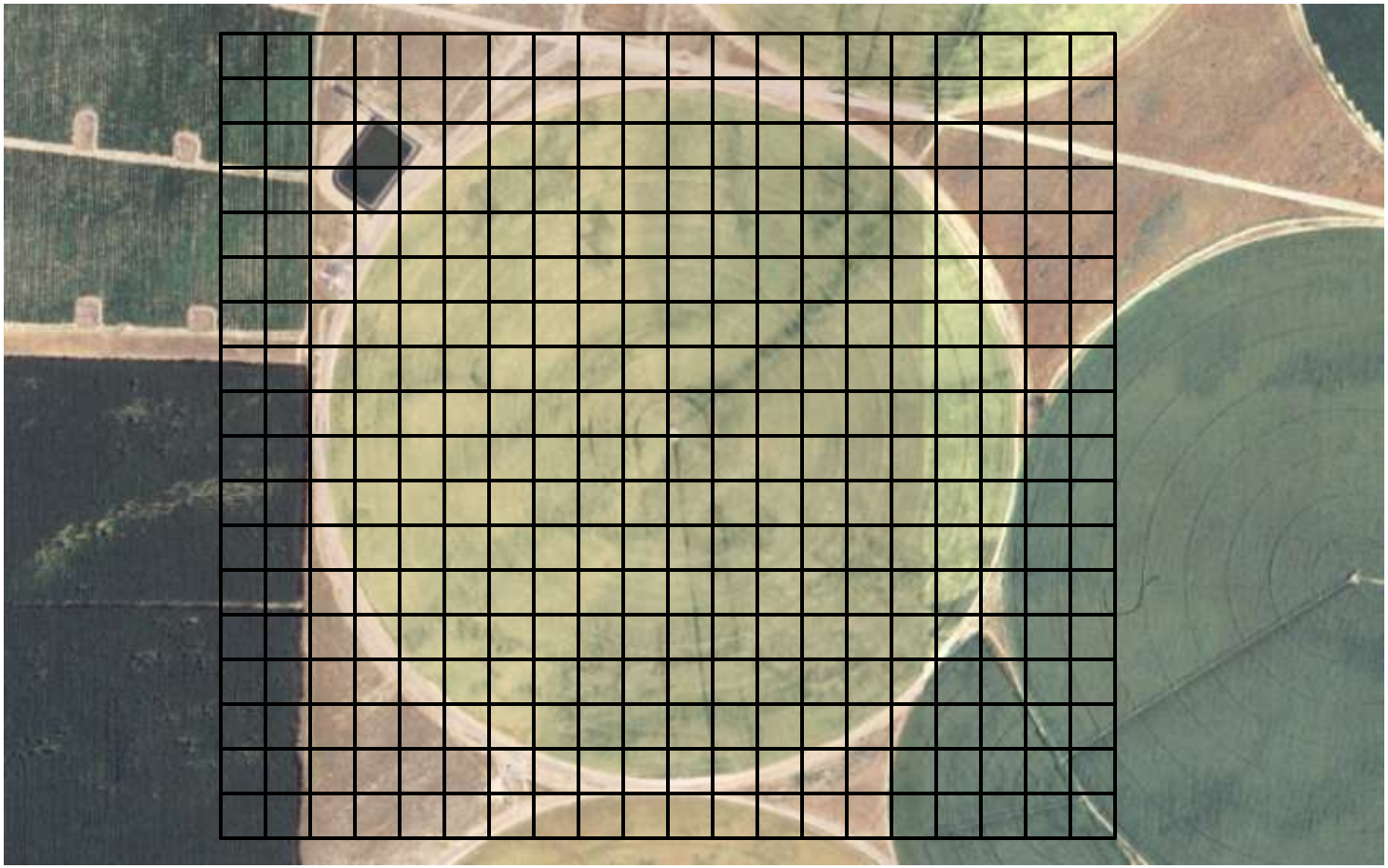
3 Acre Grid

Knowledge Acquired • Intelligence Applied



1 Acre Grid

Knowledge Acquired • Intelligence Applied

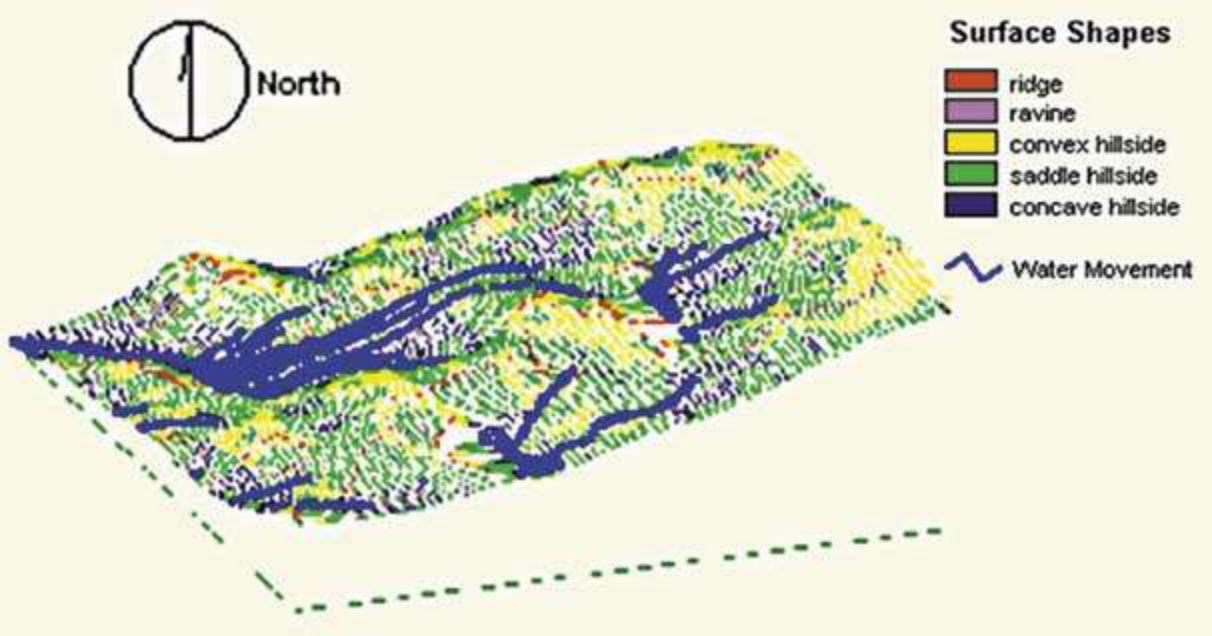


Make each sample point a "field"

Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography



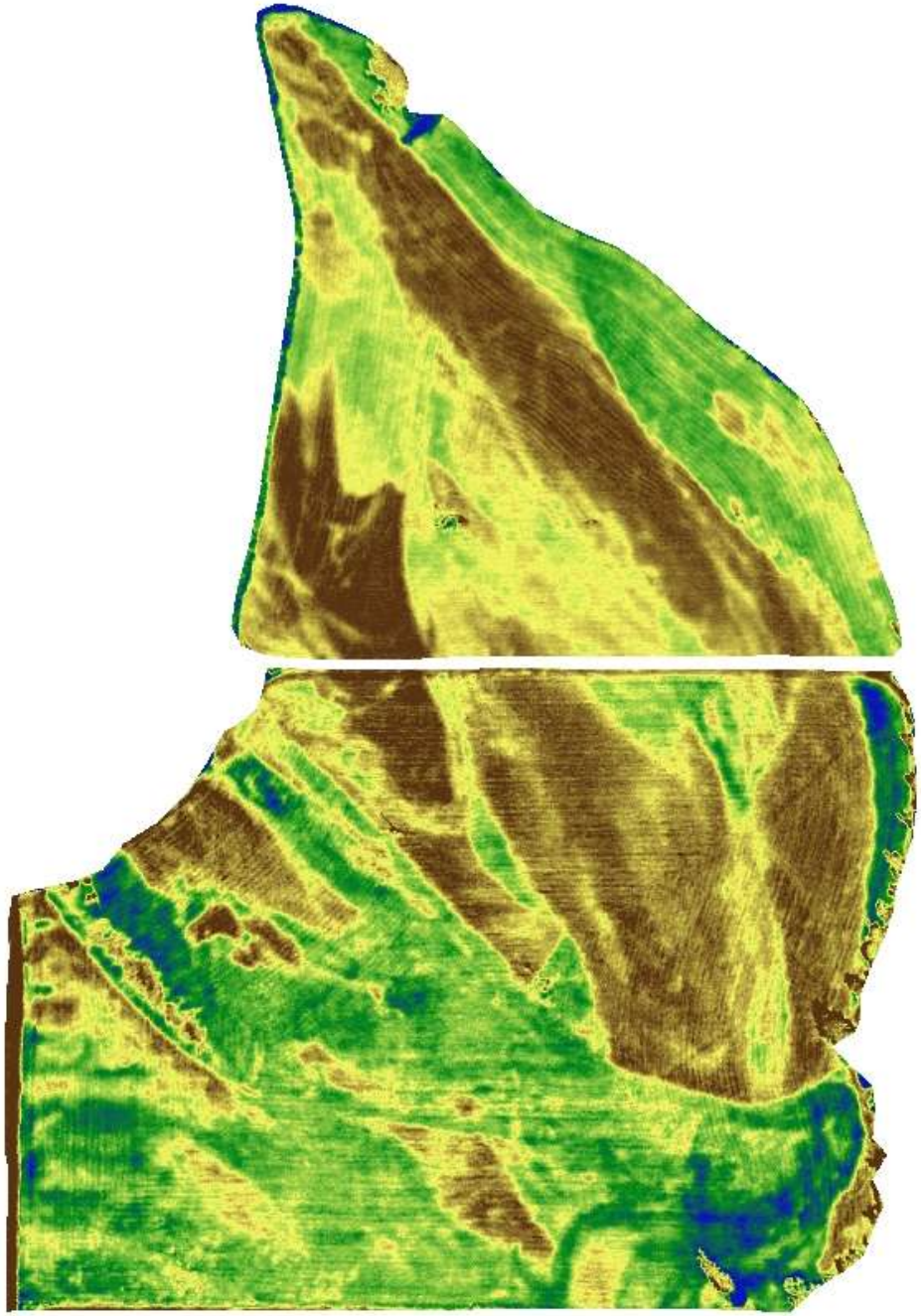
Soil Mapping

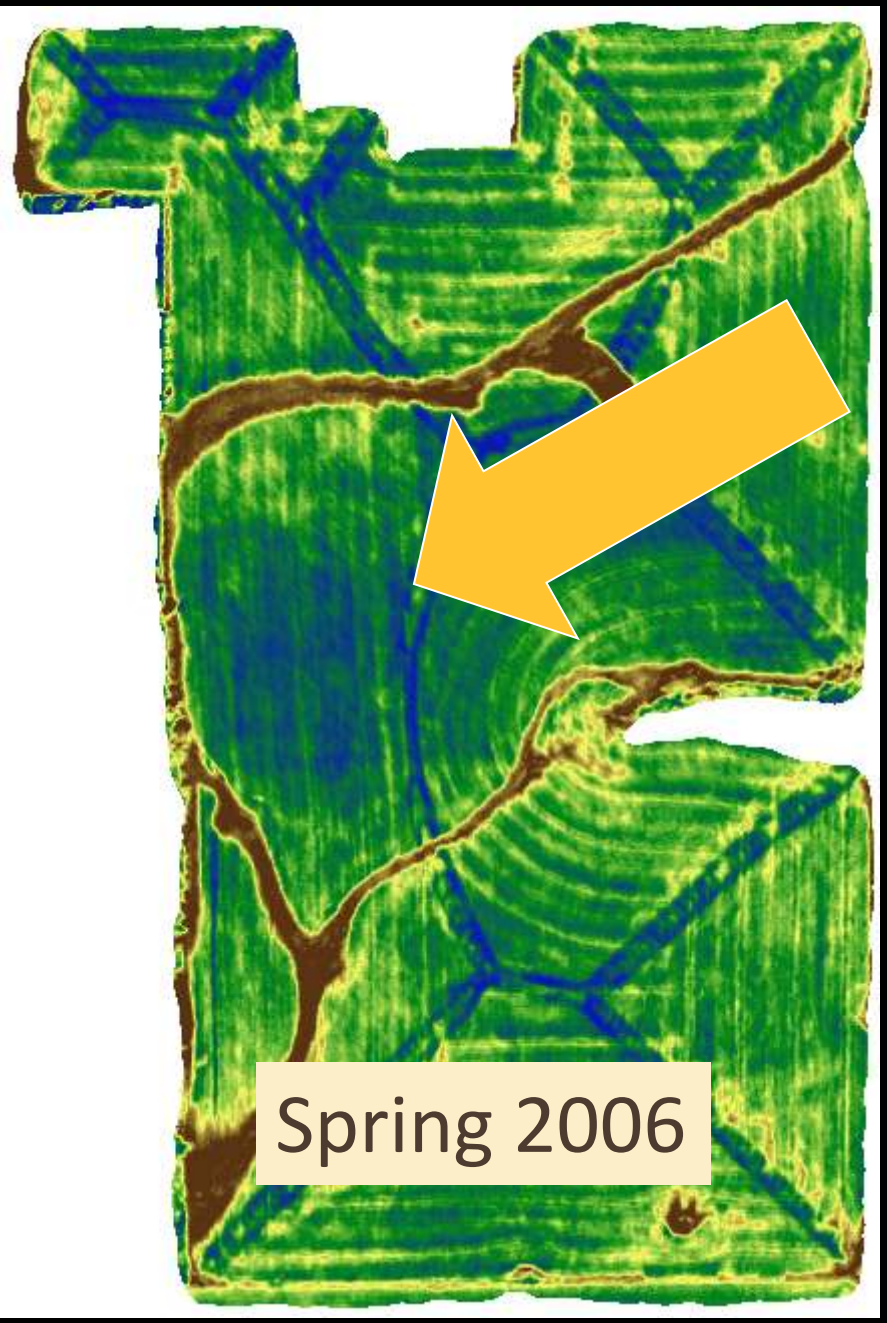
Knowledge Acquired • Intelligence Applied

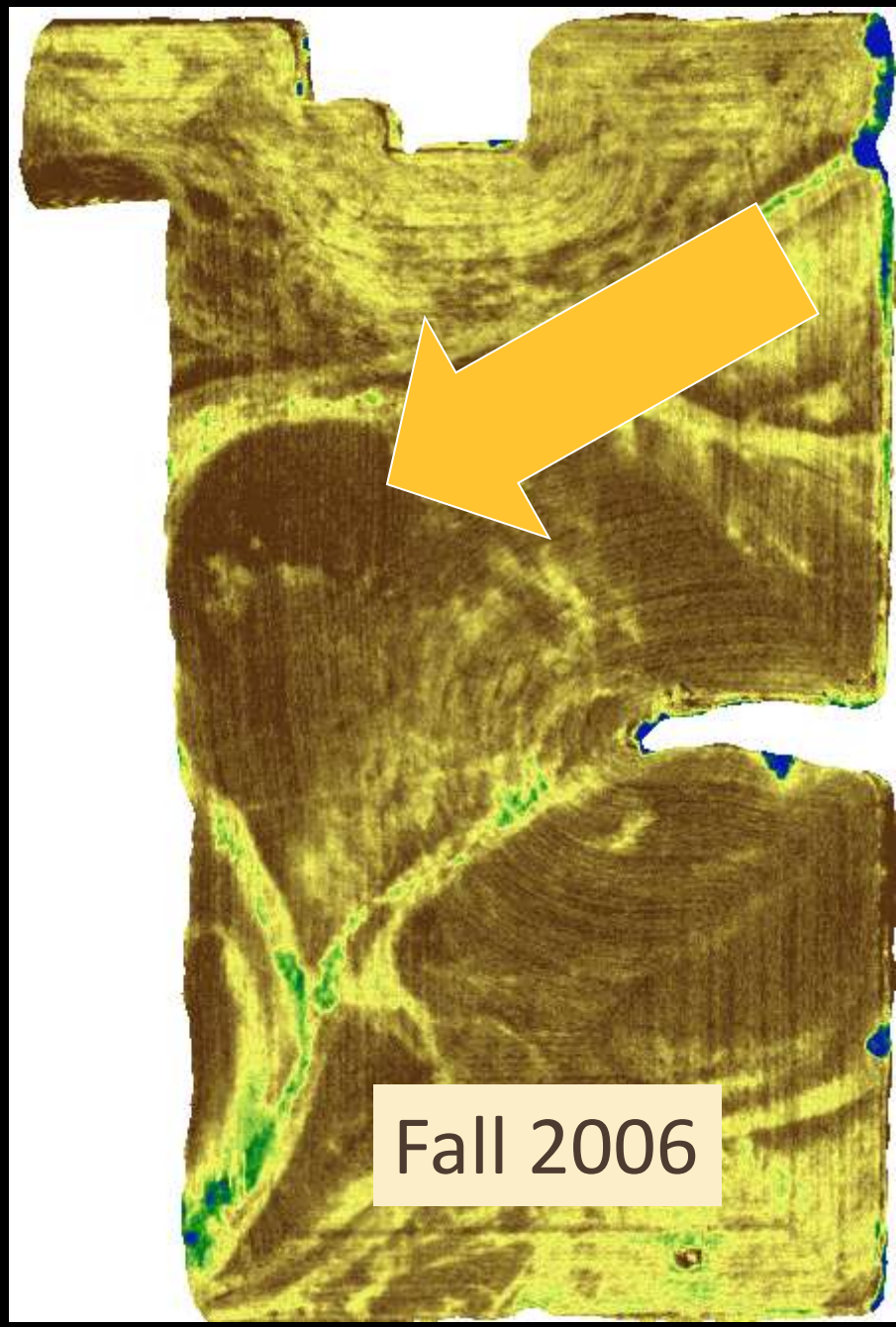
- Topography
- Remote Sensing

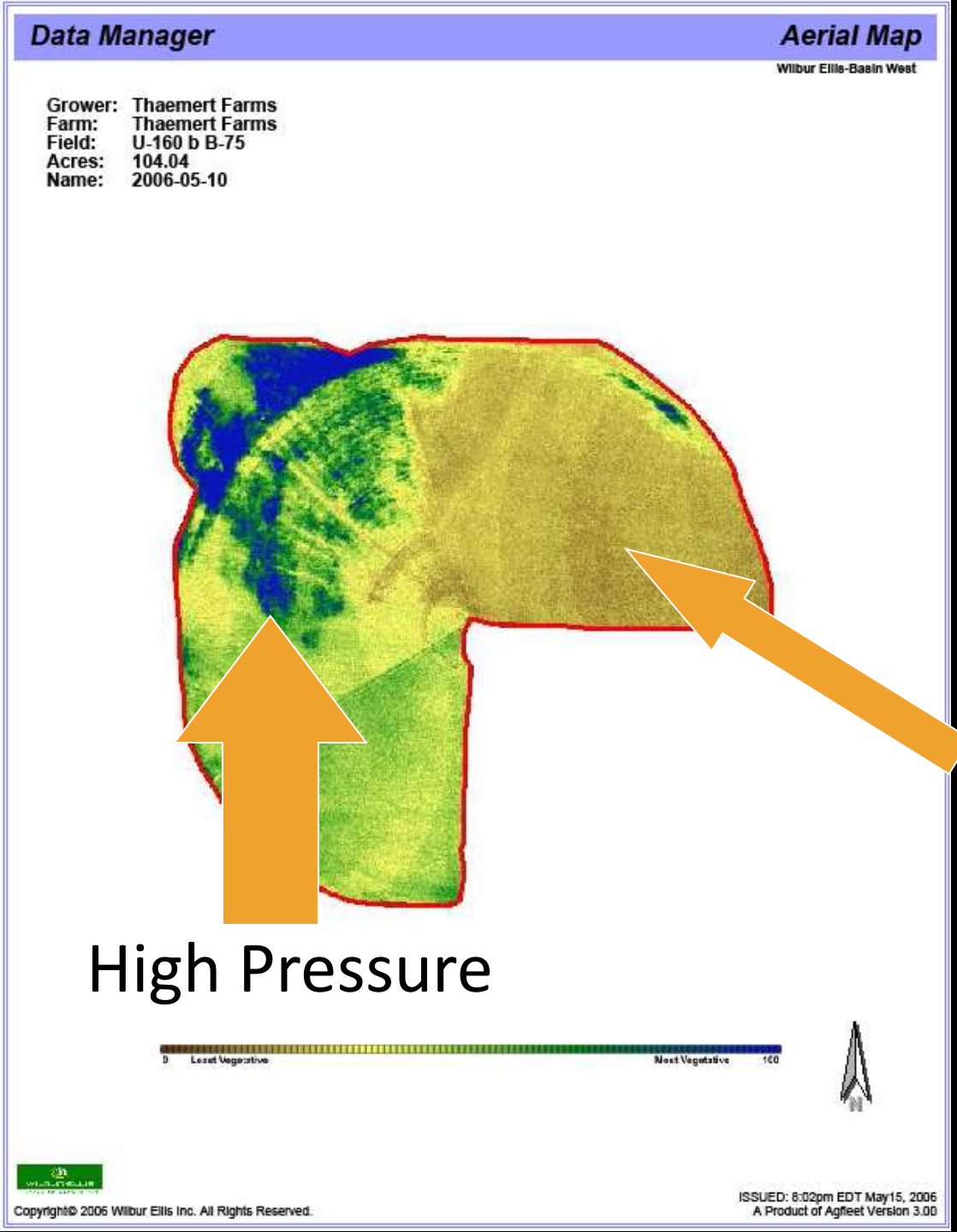
Crop Canopy

- Information
  - Soil Texture
  - Yield Potential
- Uses:
  - Herbicide application
  - Growth Regulator
  - Fertilizer
  - Scouting




Spring 2006

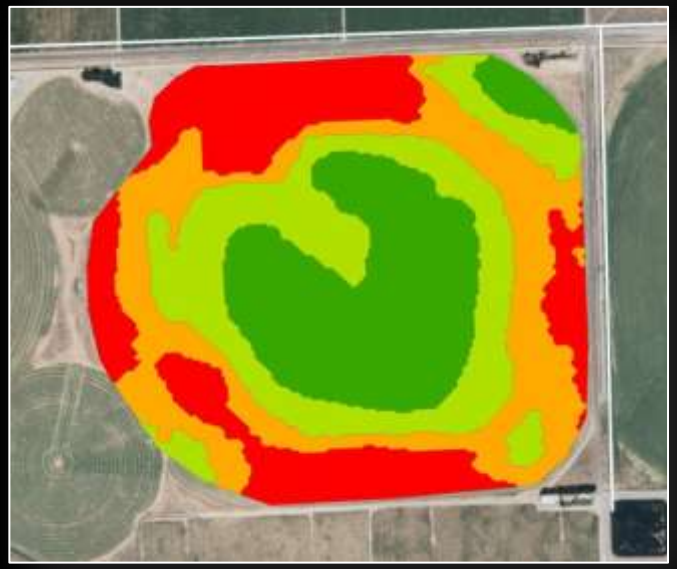

Fall 2006



Wild Oat Control

- Two rates of Buccaneer
  - On
  - Off

Low Pressure

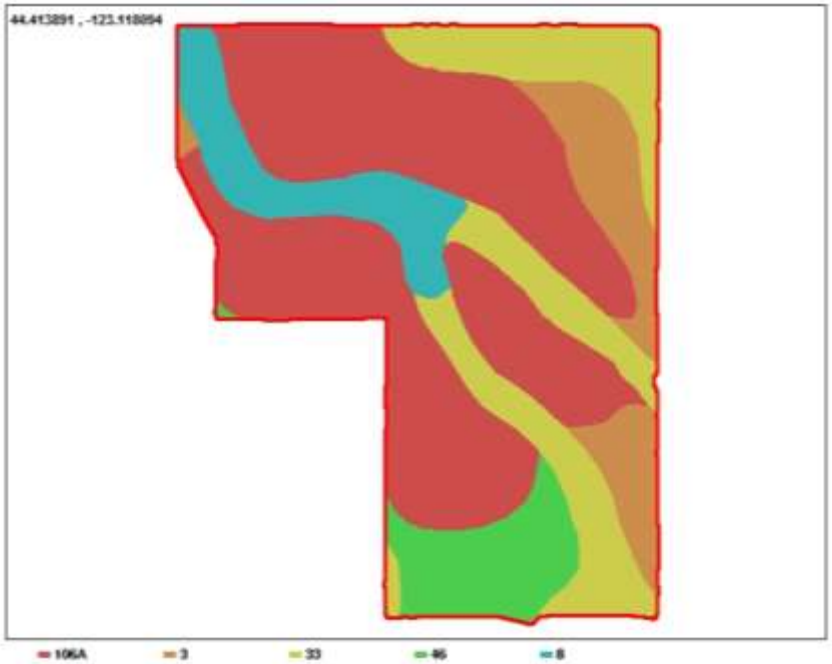


Trimble GreenSeeker

Soil Mapping

Knowledge Acquired • Intelligence Applied

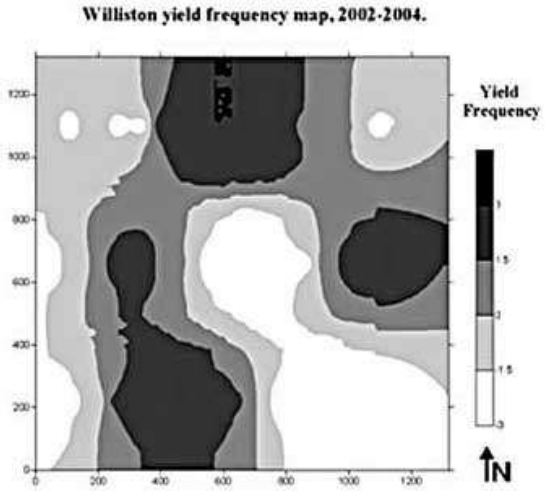
- Topography
- Remote Sensing
- Soil Maps

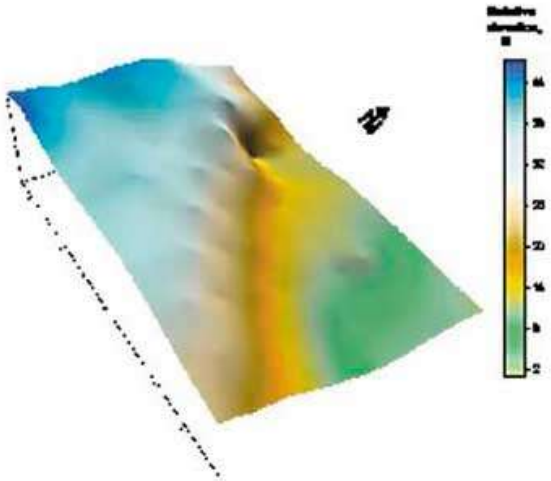


Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
- Soil Maps
- Yield





Soil Mapping

Knowledge Acquired • Intelligence Applied

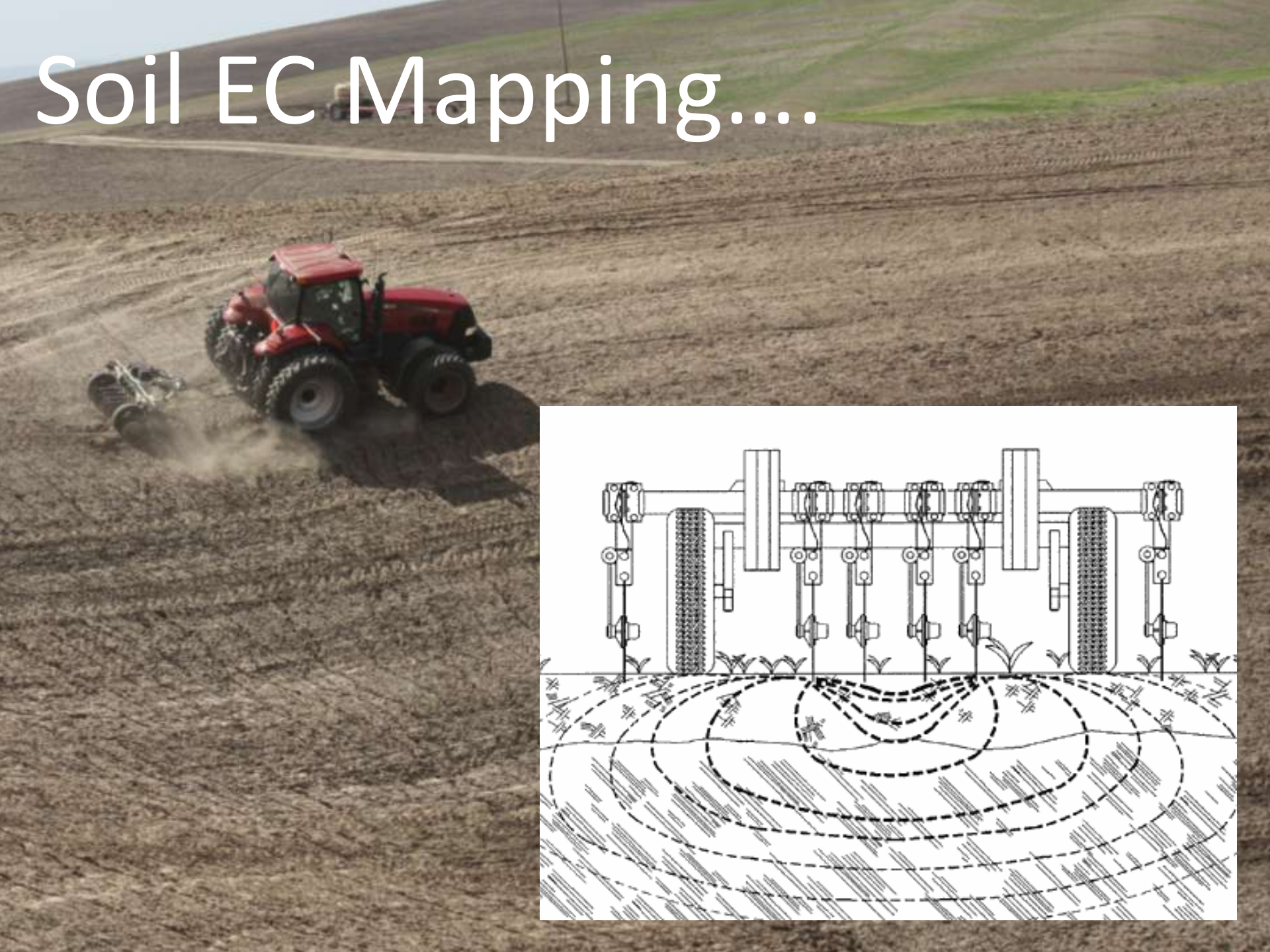
- Topography
- Remote Sensing
- Soil Maps
- Yield
- Grower

Soil Mapping

Knowledge Acquired • Intelligence Applied

- Topography
- Remote Sensing
- Soil Maps
- Yield
- Grower
- Electrical Conductivity

Soil EC Mapping….



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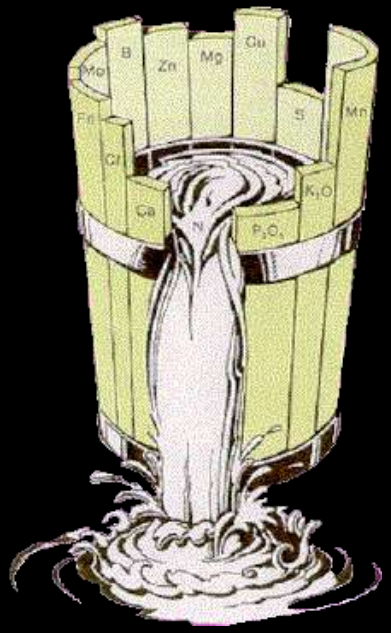

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14	22	112	181.50	940.00	5.5	0.5	2	20.0	56	1.2	2	0.04	0.92
15	25	121	181.50	920.00	5.4	0.9	2	24.0	54	1.2	2	0.06	1.45
16	13	129	96.80	2160.00	8.0	0.9	2	8.0	8	0.4	2	0.10	0.96
17	14	170	133.10	2520.00	8.0	1.0	2	10.0	12	0.8	28	0.10	1.14
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28	15	93	96.80	1620.00	7.9	0.7	1	6.0	8	0.4	18	0.05	0.77
29	22	101	169.40	900.00	5.7	0.6	2	20.0	36	1.0	62	0.05	0.86
30	21	124	157.30	1160.00	6.3	0.6	2	14.0	24	1.0	7	0.04	0.92

Fertilizer Recommendations

Knowledge Acquired • Intelligence Applied

- <u>Phosphate</u>

  P < 10 ppm – **200 lb**

  P >= 10 and < 25 pmm –

  [(25 – ST P) X 10 + 50]

  P >= 25 – **0**

- <u>Potash</u>

  K < 80 ppm – **400 lb**

  K >= 80 and < 200 ppm –

  [(200 – ST K) X 2.5 + 100]

  K > 200 – **40 lb**

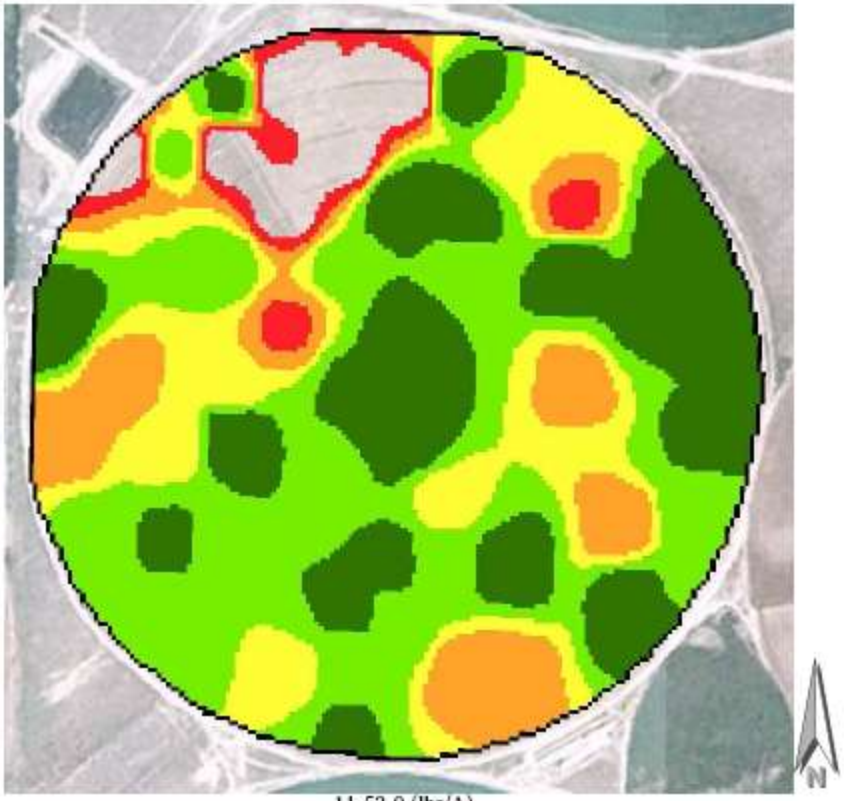
Account for :

- Yield Potential
- Soil Classes
- Varieties/hybrids
- Replants

VR Application Load Sheet

11-52-0 Fertilizer Application

Wilbur Ellis: Pasco/Umatilla
Pasco, WA



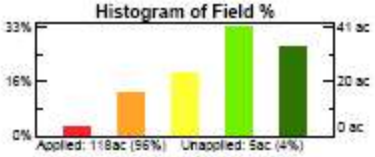
11-52-0 (lbs/A)

40.0 108.0 176.0 244.0 312.0 380.0

Grower: BASIN FARMING LLC
Farm: Wallula
Field(s): W-01
Acres: 123.71

Crop: Potatoes
Equation: Doug Strebin
Yield Goal: 1
Variety: 2009
Type: Wallula
Tgt pH: Default pH

Histogram of Field %



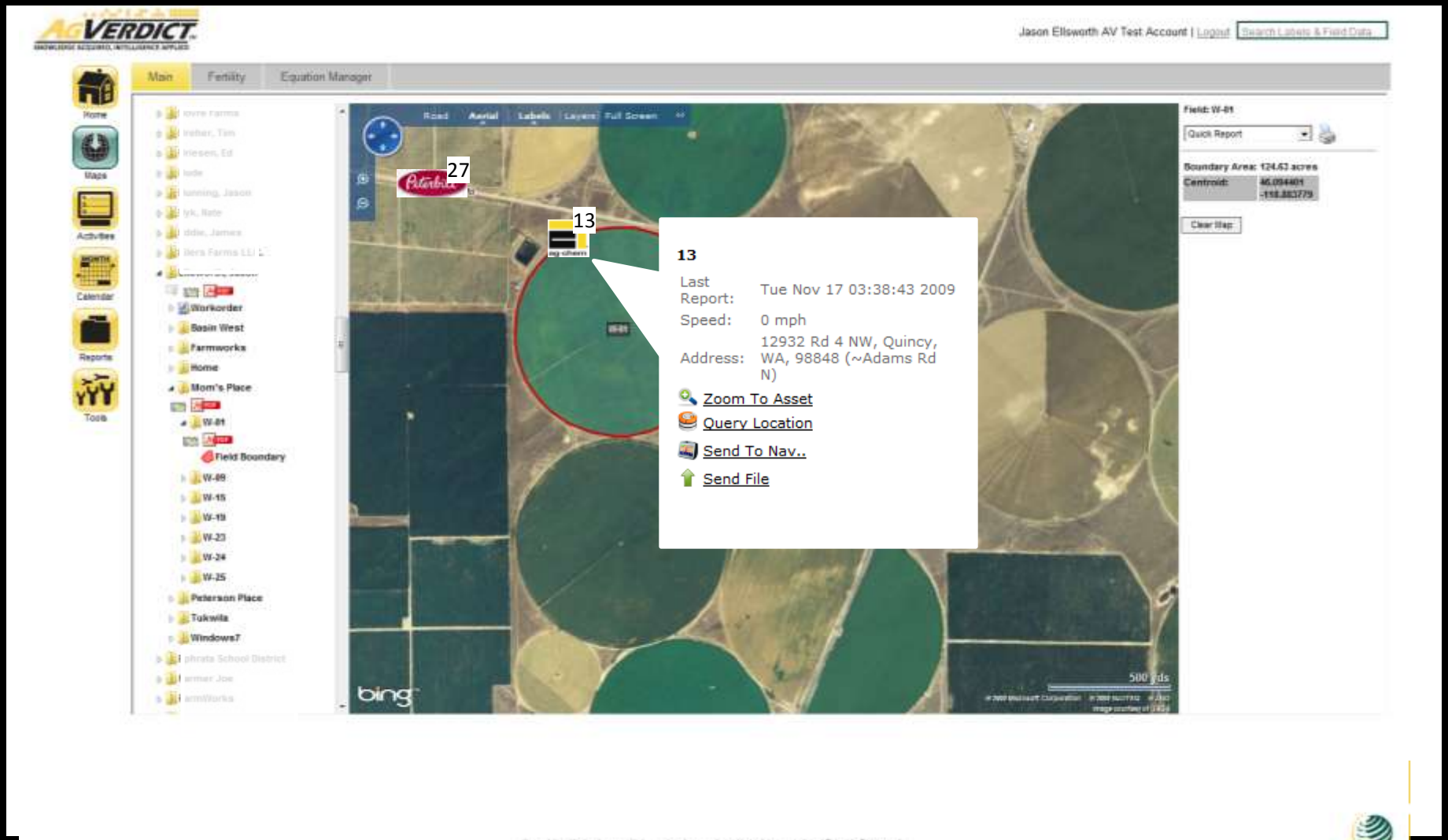
*Additional Info: _____

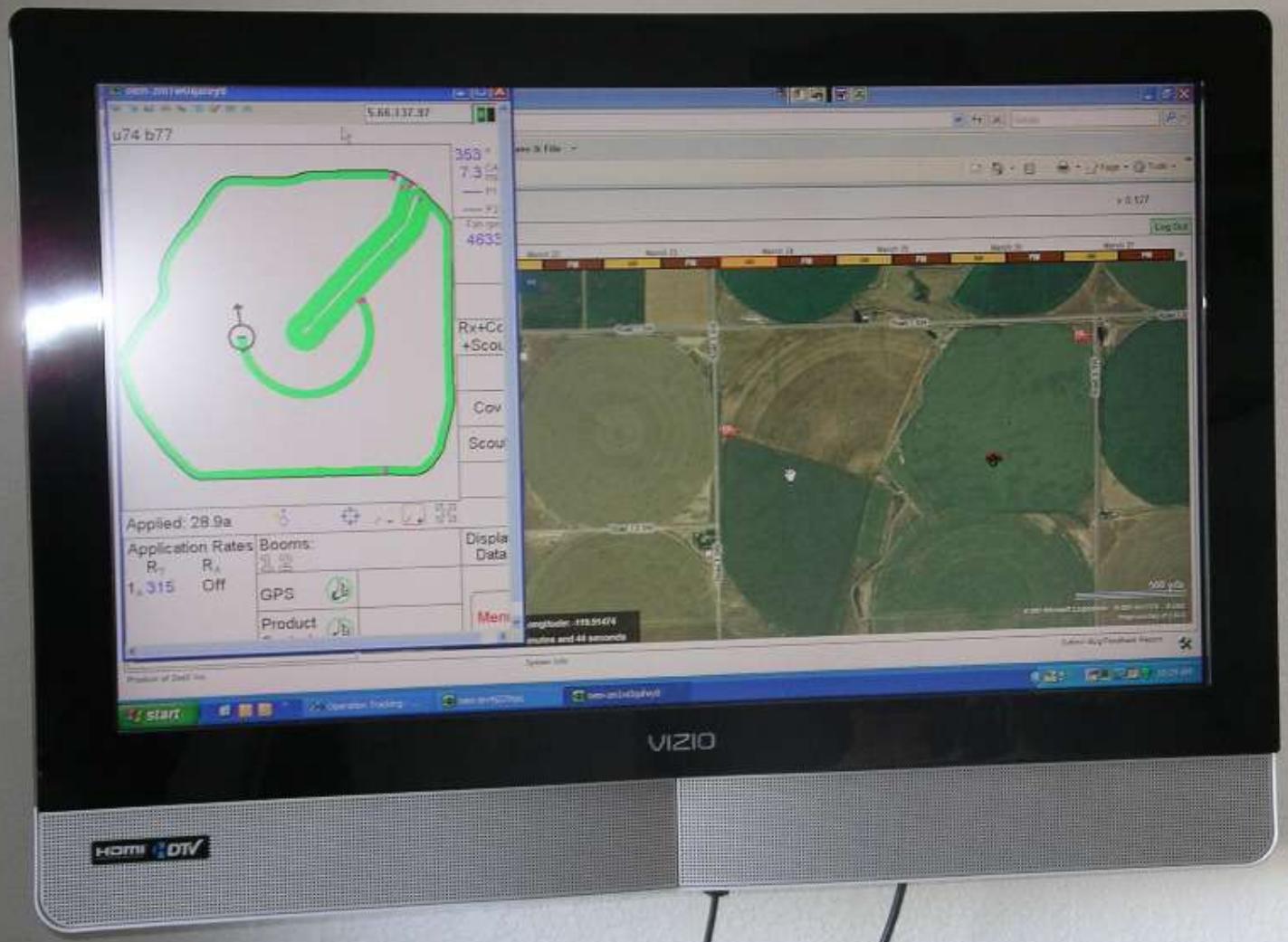
Application			
Product		**Cost**	
Addition/Deduction(lbs/ac):	None Entered	Per Acre Min(lbs/ac):	None Entered
Percent of Original App:	100%	Per Acre Cap(lbs/ac):	None Entered
Minimum Application Rate:	40.0 lbs/A	Min Non-Zero Rate(lbs/ac):	None Entered
Maximum Application Rate:	380.0 lbs/A	Est 11-52-0 Cost/Ton:	$ 0.00
Field Average Rate:	260.63 lbs/A	Est 11-52-0 Total Cost:	$ 0.00
Total Applied Acreage:	118.30	Est 11-52-0 Cost/Acre:	$ 0.00

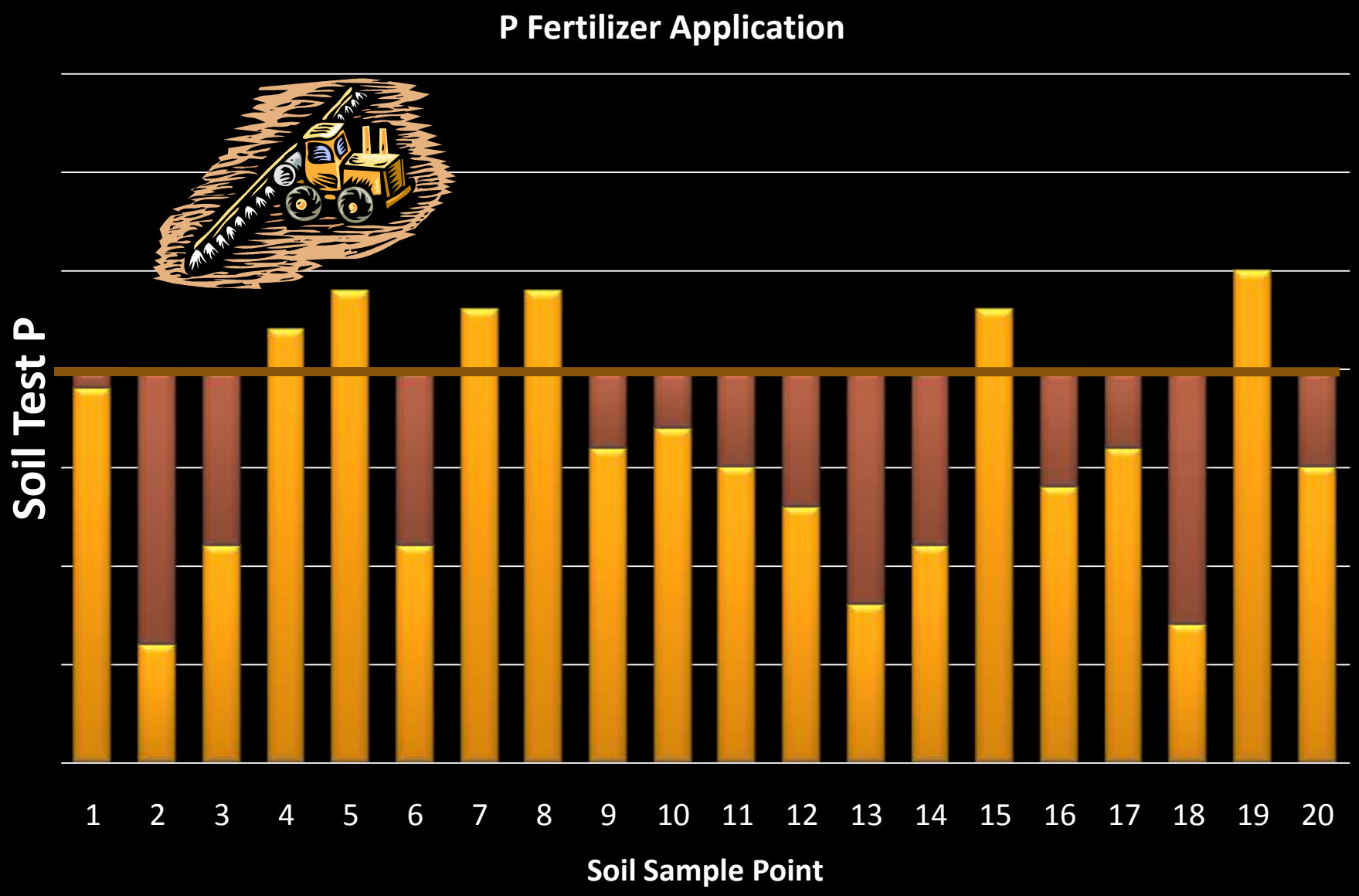
Find applicator

Knowledge Acquired • Intelligence Applied

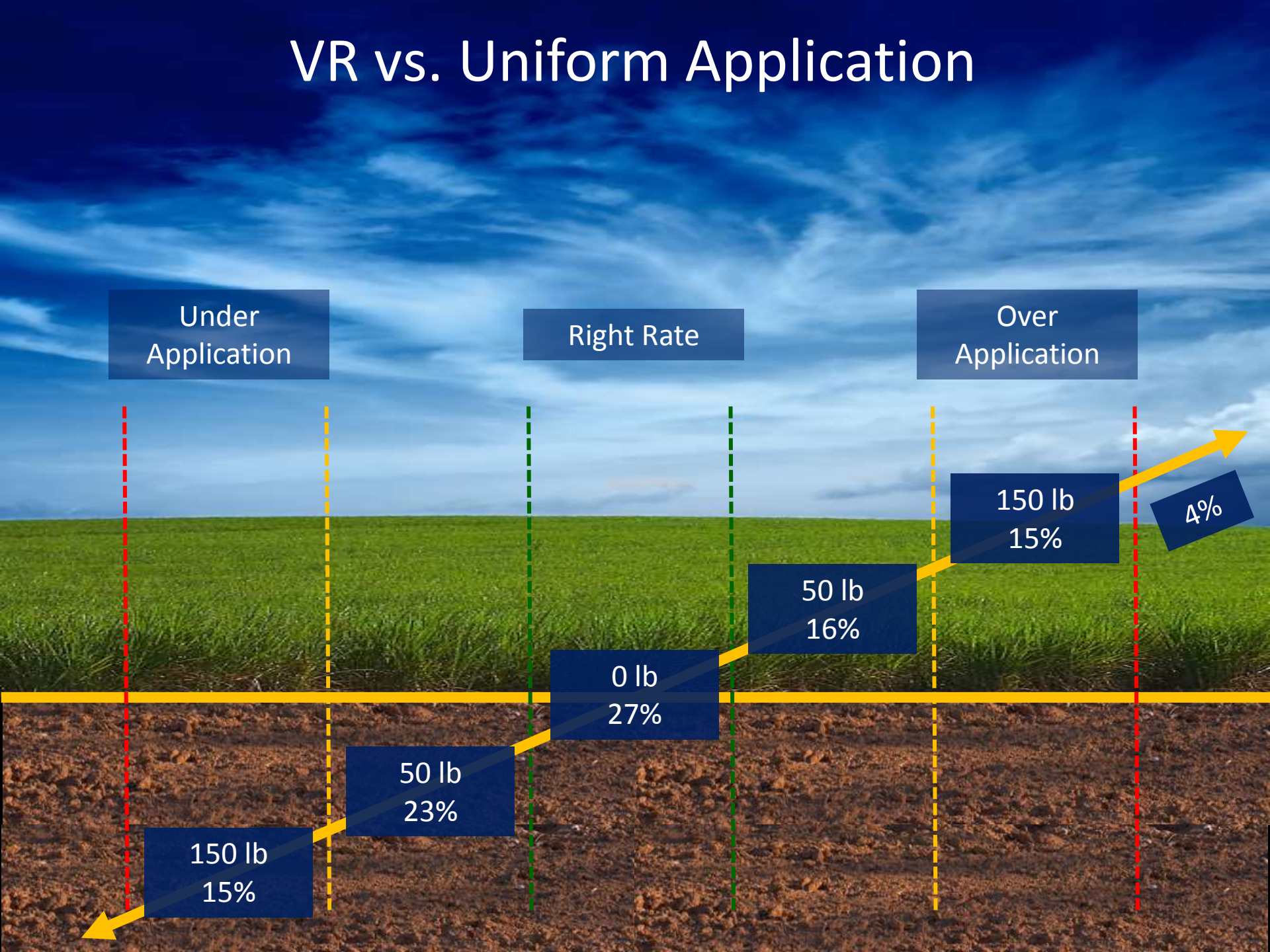
WILBUR-ELLIS®




u74 b77
Applied: 28.9a
Application Rates
Booms:
GPS
Product
Off
start
VIZIO
HDMI DTV


P Fertilizer Application
Soil Test P
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Soil Sample Point

VR vs. Uniform Application



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Knowledge Acquired • Intelligence Applied

THANKS FOR YOUR TIME